To the Commissioner of Patents:

Your petitioner, Richard Sanders, a citizen of the United States, and residing at 29 Harwich Circle, Westwood, MA 02090, prays that Letters Patent be issued to him for the invention entitled, Notebook Computer Security Lever Lock, of which the following is a specification.

Notebook Computer Security Lever Lock

RELATED U.S. APPLICATION DATA

This application is a continuation-in-part of U.S. Patent Application, 10/457,331, filed 06/10/2003.

BACKGROUND OF THE INVENTION

This invention relates to security apparatus, and more particularly to apparatus for securing notebook computer equipment.

In recent years there has been a marked increase in the amount of computer equipment used in business and at home. Not only have the number of computers increased, but their size has become steadily smaller. Computer owners carry with them and use in areas with public access smaller computers such as laptop and notebook computers. Notebook computers only weigh several pounds or less and are easily concealed on the person or in a carry bag. Equipment items in this category generally have values from one to several thousands of dollars, and are easily marketed. Equipment such as this and their component parts are, therefore, attractive, lucrative and easy targets for thieves.

Many personal computers have a security slot in an external wall. Attempts to provide securing devices centered on this

slot have been complicated. An example of this may be found in U.S. Patent No. 5,502,989 (Reexamination Certificate B1 5,502,989), issued to W.R. Murray, Jr., et al. The Murray device, inter alia, provides a security device comprised of a housing with a slot engagement portion, said portion being rotatable between an unlocked position and a locked position, and a pin coupled through the housing and extending into the security slot member after said slot engagement member is in said locked position. The Murray device is specifically designed to engage a rectangular security slot. Another approach has been used in U.S. Patent No. 5,983,679 issued to G. Reyes. The Reyes device uses a cam assembly with a single hook arm in conjunction with two prongs to engage with the predefined rectangular security slot.

A further problem with prior art locks, is the poor fit the locks make with the security slot. Many computer manufacturers have a different thickness in the wall with the security slot. Prior art locks have a set gripping width, i.e., the distance between the lock engagement end on one side of the security slot and the lock assembly itself on the other side of the security slot. Ideally, the gripping width should be as close to the width of the computer side wall as possible to prevent easy insertion of a prying device. The user must measure the wall thickness and shop for a lock with a gripping width as close to the wall thickness as possible.

Applicant addressed many of the above stated prior art problems with a notebook computer security lever locking assembly. See U.S. Patent No. 6,601,416, issued to applicant. However, even though many of the prior art problems were solved, the use of externally protruding, fixed, parallel members, along with the patented elongated lever elements, limited the holding ability of the lock assembly and its ability to work with a wider scope of security slots having different configurations.

SUMMARY OF THE INVENTION

The present invention provides a relatively simple locking mechanism for preventing the theft of a small computer, such as a notebook computer. The locking mechanism of the present invention is adapted to fit all computers made by all manufacturers, which contain a security slot in their chassis, regardless of the configuration of the security slot.

To attain this, the present invention provides lock with a cam action joined to a cylindrical assembly with a front portion adapted to being inserted into a computer chassis security slot. The cylindrical assembly front portion is comprised of two levers each terminating in a hook. Each lever is pivotally attached to the cylindrical assembly and is pivoted in a scissors motion within the security slot by the cam action of the lock. The present invention replaces the complications inherent with the

removable coupling pin of the Murray invention and eliminates the need for rotating the entire assembly in order to be positioned with a locked position. The present invention provides a sturdier locking configuration than the Reyes device. The present invention is capable of engaging a security slot having other than a rectangular configuration, a decided advantage over both the Murray and Reyes devices. The present inveniton also permits the use of larger hooking elements. The unique design of the present invention makes the present invention an ideal choice for the individual or organization that has a variety of computer brands to secure. A lockable cable engages the cylindrical assembly. The cable is secured to a fixed object to prevent the computer from being stolen or removed from a fixed location. In the present invention a variety of different type locking cables may be used.

Accordingly, it is an object of the present invention to provide a computer security locking apparatus for securing small computers, such as notebook computers, which have security slots in their chassis. It is additionally an object of the present invention to provide such an apparatus which is simple, economical, easy to use and quickly installed.

Another object of the invention is to provide such a security apparatus which is installed to said computer without modifying the computer chassis thereby removing the risk of contacting

various components and circuitry therewithin.

It is another object of the present invention to provide a security apparatus which may use different types of anchoring cables.

It is an object of the invention to provide a security apparatus which does not require rotation between locked and unlocked positions.

It is still another object of the invention to provide a security apparatus which is activated by a cam lock action.

These together with other objects of the invention, along with various features of novelty which characterize the invention, are pointed out with particularity in the claims annexed hereto and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of the invention, with a travel anchor cable, installed on a notebook computer, thereby securing the notebook computer to a table;

Fig. 2 is a perspective view of the invention, with an office anchor cable, installed on a notebook computer, thereby securing the notebook computer to a work surface;

Fig. 3 is a close up perspective view of a computer open security slot.

Fig. 4 is a side view of the invention installed in a computer open security slot.

Fig. 5 is a close up, exploded view of the invention without an anchor cable.

Fig. 6 is a side elevational view, partly exploded, of the invention lock assembly, cam cylinder and invention levers.

Fig. 7A is a front view of the cam cylinder force field with levers in an unlocked configuration.

Fig. 7B is a front view of the cam cylinder force field with levers in a locked configuration.

Fig. 8A is a front view of the cam cylinder with lever rearward ends in an unlocked position.

Fig. 8B is a front view of the cam cylinder with lever rearward ends in a locked position.

Fig. 8C is a rear view of the cam cylinder.

Fig. 9 is a perspective view of a ring used on the encasement element.

Fig. 10 is a perspective view of the encasement element.

Fig. 11 is a side cross-sectional view of the encasement element.

Fig. 12 is a side view of the encasement element.

Fig. 13 is a perspective view of the assembled invention without an anchor cable.

Fig. 14 is a side cross-sectional view of the assembled invention shown in Fig. 13.

Fig. 15 is a rear sectional view of the assembled invention shown in Fig. 13.

Fig. 16 is a side view of one end of the holding end of an anchor cable.

Fig. 17 is a rear view of the cable lock housing.

Fig. 18 is a front view of the cable lock housing.

Fig. 19 is a cross section view of the cable lock housing.

Fig. 20 is a side diagramatic side view of the cable lock housing.

Fig. 21 is a diagramatic side view of the encasement element with lock assembly installed.

Fig. 22 is a front view of the adjustment spacer.

Fig. 23 is a side diagramatic view of the invention in a locked configuration.

Fig. 24 is a side diagramatic view of the invention in an unlocked configuration.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings in detail wherein like elements are indicated by like numerals, there is shown an embodiment of the notebook computer security lever locking assembly **1** of the present invention. The invention **1** provides a cylindrical assembly **50** joined to a cam lock assembly **20** and an anchored locking cable **5**. The cylindrical assembly **50** is comprised of a hollow cylindrical encasement element **60** within a cable lock housing **180**. The encasement element **60** and cable lock housing **180** have concentric central axes which also define their longitudinal axes.

In the example shown, the computer **10** secured is a notebook computer. The computer **10** could be a smaller or a larger personal computer. The computer **10** has a generally rectangular configuration, with a front outer wall **11**, rear outer wall **12**, two outer side walls **13**, a top **14**, and a bottom **15**. One of the

computer sides **13'** has an open security slot **16** formed therein. For exposition purposes, the security slot **16** has a generally rectangular configuration. The security slot long edges **17** define the security slot's longitudinal axis. In this embodiment, the security slot short edges **18** are parallel to the computer chassis top **14** and bottom **15**. The locking cable **5** is inserted into the cable lock housing **180**. The forward end **51** of the cylindrical assembly **50** is placed against the open security slot **16**.

The cam lock assembly **20** is encased within the cylindrical assembly **50**, said cam lock assembly **20** having two lever elements **80** protruding through the cylindrical assembly front end **51** into and through the open security slot **16**. Manipulation of the cam lock assembly **20** locks the cylindrical assembly to the computer **10**. The locking cable **5** is fastened to an appropriate secure object such as a table leg **3**.

The encasement element **60** has two ends, one termed the entry end **61** and the other termed the exit end **62**. Referring more particularly to Figs. 5, 11 and 12, the encasement element **60** is shaped and formed by a cylindrically curved, wall **63**, preferably made from metal, extending from the entry end **61** to the exit end **62**. The encasement element entry end **61** is open. The entry end **61**, exit end **62** and wall **63** define a hollow interior **64**. The wall **63** has an exterior surface **65** and an interior surface **66**. The encasement element exit end **62** is closed with a flat end wall **67**

having a small, central, elongated opening **68** therein. The encasement element **60** has a threaded radial channel **72** formed in the wall exterior surface **65** adjacent the encasement element exit end **62**. The encasement element **60** also has a relatively shallow, smooth radial channel **73** formed in the wall exterior surface **65** rearward toward the encasement element entry end **61**. The encasement element **60** has a small circular radial opening **75** formed in the smooth radial channel **73**. There is another small circular radial opening **74** formed in the threaded radial channel **72**, into which a small spring **70** and small ball **71** are inserted.

The encasement element interior **64** is formed into two sections, the entry end interior **58** and exit end interior **59**. The exit end interior **59** is that portion of the encasement element defined by the threaded radial channel **72** and exit end **62**. The diameter of the exit end interior **59** is less than the diameter of the entry end interior **58**.

The encasement element **60** has two elongated lever elements **80** extending through the exit end opening **68** into the encasement element interior **64**. The lever elements **80** are pivotally pinned in position by a pin **81** extending through the radial channel radial opening **74**. Each lever **80** has a body **85** defined by rearward end **83** positioned within the encasement element interior **64** and a forward end **82** protruding out of the encasement element and terminating in a half crossbar **84** giving the lever **80** the

general shape of an inverted "L". Each lever **80** has a longitudinal axis defined by the rearward end **83** and the forward end **82**. The longitudinal axis of each lever **80** in an unlocked positioned is generally perpendicular to the plane of the end wall **67** and parallel to the cylindrical encasement element **60** longitudinal central axis. Each lever body **85** has a generally rectangular cross-section. Each lever rearward end **83** terminates in a cylindrical shaft **86** with a central axis coincident with the longitudinal central axis of the lever **80**. Each lever body **85** has an aperture **87** formed through it at each lever's approximate longitudinal midpoint. Each lever **80** is adapted to pivotally rotate about the pin **81** positioned through the aperture **87**, one lever pivoting in one direction and the other lever pivoting in an opposite direction, thereby forming a scissor crossing effect. The body **85** of each lever element **80** is substantially contained within the encasement element exit end interior **59**. Each lever cylindrical shaft **86** protrudes into the encasement element entry end interior **58**.

The encasement element **60** is further comprised of a ring **55** having an outer surface **56** and a threaded inner surface **57**, said ring **55** adapted to threadingly engage the encasement element threaded channel **72**. The spring **70** and ball **71** are adapted to hold the ring **55** in place. The ring **55** has a radial outer diameter equal to the radial outer diameter of encasement exterior

surface **65**. The ring outer surface **56** is nominally smooth. However, for improved gripping purposes the outer surface **56** may be knurled or otherwise ridged or channeled for gripping purposes.

The cylindrical encasement element **60** is housed within a cable lock housing **180**. An anchored locking cable **5** is removably attached to the cable lock housing **180**. The cable lock housing **180** has an enclosed front end **181** from which a cylindrical side wall **183** extends to an open rear end **182**, said front end **181** and rear end **182** defining a cable lock housing longitudinal axis, said front end **181**, side wall **183** and rear end **182** defining a cable lock housing hollow interior **184**, said cable lock housing **180** being generally cylindrical in shape. The cable lock housing front end **181** has a generally circular aperture **189** formed centrally therein. The side wall **183** has a smooth exterior surface **185** and a smooth interior surface **186**.

The side wall exterior surface **185** has a rounded, radially protruding, elongated element **190** formed thereon extending longitudinally from the housing rear end **182** to an approximate housing longitudinal midpoint **187**. The protruding element **190** has a closed forward end **191**, an open rearward end **192**, a radially rounded top **193** and a bottom **194** formed from the housing side wall **183**, said forward end **191** and rearward end **192** defining a protruding element longitudinal axis, said protruding element longitudinal axis being parallel to the cable lock housing

longitudinal axis. The forward end **191**, rearward end **192**, top **193** and bottom **194** define a protruding element interior **197**. The protruding element **190** is divided longitudinally into a forward section **195** and a rearward section **196**. The interior **197** portion of the protruding element forward section **195** is solid. However, an inwardly protruding spring-loaded ball **188** is embedded in the forward section protruding element bottom **194** projecting inwardly toward a cable lock housing central longitudinal axis. The spring-loaded ball **188** is adapted to engage the encasement element exterior surface smooth radial channel **73**.

The interior **197** portion of the protruding element rearward section **196** is hollow. The bottom **194** portion of the protruding element rearward section **196** is open. A radial channel **198** is formed within the protruding element rearward section interior **197** portion adjacent the protruding element forward section **195** interior **197** portion. The radial channel **198** has a diameter greater than the diameter of the open rearward end **192** and a bottom **194** opening greater than the bottom **194** opening of the open rear end **192**.

The cable lock housing **180** and encasement element exterior surface **65** combination is used in conjunction with an anchored locking cable **5**. The locking cable **5** has two ends, an anchored end **6** and a holding end **7**. As may be seen in Figs. 1A, 1B and 2, the cable anchored end **6** may terminate in a simple slip knot and

wrapped around a secure object such as a table leg **3**. The cable anchored end **6** may also be attached to a special adaptor **4** glued to a secure object such as the underside of a desk. Any number of anchor cables having different anchored ends **6** may be used with the present invention. The holding end **7** of the cable is comprised of a cylindrical shank **8** terminating in a disk-like protrusion **9** having a diameter greater than said shank **8**. The anchor cable **5** is adapted to being connected to the cable lock housing **180** by sliding the anchor cable disk **9** into the protruding element radial channel **198** through the protruding element rearward section open bottom **194** and threading the cable shank **8** through the protruding element rearward end **192**. The encasement element **60** is then slid into the cable lock housing interior **184** and the cable **5** is secured within the protruding element radial channel **198**.

As stated above the cylindrical assembly **50** is joined to a cam lock assembly **20**. The lock assembly **20** is comprised of a lock mechanism **21**, and a cam unit **30**. The lock mechanism **21** is a conventional key **2** operated lock with internal indents (not shown) to hold the key rotational turn at either 0° or 90°. The lock mechanism **21** has a rear portion **22** adapted to receive a key **2**, a forward portion **23** and a cylindrical body **24** defined by said rear and forward portions **22**, **23**. The lock mechanism **21** has a circular opening **26** formed in its wall **63**. The opening **26** is adapted to receive a pin **27**. The longitudinal axis of the lock mechanism **21**

is defined from the rear portion **22** to the forward portion **23**. The lock mechanism central longitudinal axis is concentric with the central longitudinal axis of the cylindrical assembly **50**. The forward portion **23** has a central, generally rectangular block element **25** protruding outward therefrom in a forward direction along the central longitudinal axis of the lock mechanism **21**. The lock mechanism **21** is so constructed that movement of the key 90° causes a direct corresponding turn of the block element **25**.

The lock mechanism forward block element **25** fits into the cam unit **30**. The cam unit **30** has a rear wall **31** from which cylindrical side walls **32** extend horizontally forward, said cam unit **30** being generally cylindrical in shape, the longitudinal axis of said cam unit **30** being generally perpendicular to the rear wall **31** of said cam unit **30**, said cam unit **30** having a front wall **33** connected to said cylindrical side walls **32**, said front wall **33** being generally parallel to said rear wall **31**. The cam unit rear wall **31** has a generally rectangular, central aperture **34** formed therein, said aperture **34** adapted to receive the lock mechanism forward block element **25**. The cam unit front wall **33** has an elongated central slot **35** formed therein. The slot **35** and aperture **34** each have a longitudinal axis perpendicular to the cam unit **30** longitudinal axis.

The external diameters of the lock mechanism **21** and cam unit **30** are approximately the same. The external diameters of the lock

mechanism **21** and cam unit **30** are slightly less than the diameter of the encasement element entry end interior **58**, but greater than the diameter of the encasement element exit end interior **59**. The lock assembly **20** is adapted to fit substantially into the encasement element entry end interior **58**, cam unit front wall **33** first. The lever element cylindrical shafts **86** fit into the cam unit front wall slot **35**. The lock mechanism body opening **26** is aligned with the encasement element circular opening **75**. A pin **27** engages the two openings **26**, **75** and thereby holds the cam lock assembly **20** in place within the encasement element interior **64**.

In operation, the anchor cable **5** is installed as described above. The cylindrical element forward end **51**, comprising the lever element forward ends **82**, are inserted into computer open security slot **16**. The key **2** is then turned 90°. The lock mechanism forward block element **25** will turn 90°, thereby turning the cam unit **30** 90°. The cam unit slot **35** will thereby turn, causing a "camming" action on the lever element cylindrical shafts **86** thereby causing the lever bodies **85** to pivot in opposite directions. This results in the one lever element forward end **82** moving toward a security slot edge **17** and the other lever element forward end **82** moving toward the opposite security slot edge **17'**.

Figs. 7A and 7B illustrate the force exerted by the cam unit front slot **35** on the lever rearward ends **83**, while Figs. 8A and 8B illustrate the actual corresponding movement of the slot **35**

against the lever rearward ends **83**. Figs. 7A and 8A show the cam unit **30** positioned so that the levers **80** are generally parallel and in an "unlocked" mode. Figs. 7B and 8B illustrate the cam unit **30** being turned 90° to the "locked" mode, and the consequent affect on the lever rearward ends **83** causing the levers **80** to scissor about the pin **81**. The lever element half cross bars **84** will engage each of the edges **17** or **17'**.

Different computers may have different thicknesses for the wall **13'** containing the security slot **16**. The present invention provides a means for adjusting the gripping width of the present invention lock assembly **1**. The gripping width is defined as the distance between the underside of the lever cross bars **84** and the cable lock housing front end **181**. Ideally, the gripping width should be as close to the width of the computer side wall **13'** as possible. Adjustment is provided with the ring **55** in threading engagement with the encasement element threaded channel **72**. By manipulating this ring **55** the overall longitudinal length of the encasement element **60** may be increased or decreased changing the extension of the lever elements **80** from the encasement element end wall **67** and through the cable lock housing front end **181** into the security slot **16**, thereby affecting the gripping width of the lock assembly **1**.

An adjustment spacer **77** is also provided. The adjustment spacer **77** is a round, flat piece with an elongated aperture **78**

formed centrally therein. The spacer **77** has a thickness equal to the thickness of the housing front end **181**. encasement element **60** with cam lock assembly **20** may be fitted to a computer **10** by removing the cable lock housing **180** and placing the spacer **75** over the protruding lever elements **80**. The spacer **77** replaces the cable lock housing **180**. The encasement element **60** with cam lock assembly **20** and spacer **77** are fitted into the security slot **16**. After a desired adjustment is made by manipulation of the ring **55**, the spacer **77** is removed and the cable lock housing **180** is fitted over the encasement element **60** for installation on the computer **10**.

It is understood that the above-described embodiment is merely illustrative of the application. Other embodiments may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.